87-058270/09 E36 H04 SHEL 26.08.85
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Synthesis gas from prodn. hydrocarbon esp. methane - by conversion with steam to prod. contg. hydrogen and carbon mon:oxide, catalytic partial oxidn. of prod. and removal of carbon di:oxide

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E(10-J2D, 31-A1) H(4-E4, 4-F2E) N(2-C)

Synthesis gas is prepd. from a hydrocarbon-contg. feed (I) by
(a) converting at least part of (I) at elevated temp. and pressure with steam to a product (II) containing H_2 and CO;
(b) subjecting (II) and any remaining (I) to catalytic partial oxidn. with an O_2-contg. gas (III); and
(c) removing CO_2 from the prod. of step (b).

ADVANTAGE

By carrying out step (b) after step (a), extreme conditions in (a) are avoided. (I) is esp. methane or natural gas. Synthesis gas obtd. may be converted to hydrocarbons with a Fischer-Tropsch catalyst.

PREFERRED CONDITIONS

Step (a) takes place at 500-900° C, 15-30 bar, with a catalyst, e.g. Ni supported on alumina, or at higher temp. in absence of a catalyst; space velocity of hydrocarbon is 700-1000 and that of steam is 3800-4200 l. (S.T.P.)l. catalyst/hr.

Step (b) takes place at 600-1100° C, 10-50 bar, space velocity 5000-10000 l./l./hr., with a nickel on alumina catalyst.

CO_2 removed in step (c) may be fed to step (a) and/or step (b); further CO_2 for feed to these stages may be obtd. by additional steps of converting hydrocarbon + steam to a prod., contg. CO_2 and H_2, partial oxidn., and recovery of CO_2. Some of the synthesis gas produced in the reaction may be converted to light hydrocarbons which are added to the feed of step (a).

EXAMPLE

Natural gas (800 l./l./hr.) and steam (4000 l./l./hr.) are contacted at 500-850° C, 38 bar, with a supported nickel catalyst; 90 vol. % of the natural gas is converted. The product, containing 85 vol. % H_2 + CO, is contacted with oxygen and a supported nickel catalyst at 8500 l./l./hr., temp. up to 950° C, 35 bar. CO_2 is separated from the product by absorption with a liquid organic amino cpd. After CO_2 removal, product is 97 vol. % H_2 + CO, in

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molar H_2/CO ratio 3.9:1.(9pp1644RKMHDwgNo0/7).
(E)ISR: No Search Report.

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